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To those of us who have been accustomed to think of mathematics as the simplest form of abstract reasoning it will seem a bit difficult to reconcile the foregoing with the following statement found on pp. 9–10:

> But in the end, if the Modern School is to be adequate to the need of modern life, this concrete training must produce sheer intellectual power. Abstract thinking has perhaps never played so important a part in life as in this materialistic and scientific world of ours—this world of railroads, automobiles, wireless telegraphy, and international relationships.

Dr. Snedden, Dr. Flexner and others who are attacking mathematics are insisting that the burden of proof to show that it should remain in the curriculum is upon those who advocate its continuance and not upon those who would eliminate it. To the writer it seems that these iconoclasts are placing entirely too much faith in the methods of experimental pedagogy so enthusiastically advocated in schools of education at the present time. Experimental pedagogy is a great improvement, but it should be borne in mind that it is only an improvement. It merely attempts to formulate explicitly experimentation which the race has long carried on informally. Humanity decided from its experience that mathematics was valuable and placed it in the course of study. It would seem that the burden of proof ought to be upon the man who would replace it with something else to demonstrate beyond question that the substitute is better than the original.

If these iconoclasts are right, the college teachers ought to be among the first to discover it and to aid in making proper readjustments. But regardless of whether they are right or wrong, teachers of college mathematics ought to be giving more thought and attention to the purposes of their teaching and the sequence and content of courses. Much remains to be done toward organizing and standardizing the undergraduate mathematical curriculum in colleges and universities. There is a somewhat general agreement as to sequence and content of courses so far as to include elementary differential and integral calculus; but beyond that point there is great variation both in opinion and practice.

It ought not to be that each college or university should be left to work out these problems by itself. There ought to be such coöperation as would enable each school to profit by the experience and counsel of others.

The editors would like to see more use made of this department in attacking these and such kindred problems as the proper differentiation of courses for groups of students specializing along different lines. Questions 2, 7, 11, 16, 27, 30 and 31 serve as a beginning in this direction. We hope that more questions will be sent in and also many more replies to questions 27, 30 and 31.

DISCUSSIONS.

RELATING TO "THE UNIFICATION OF FRESHMAN MATHEMATICS."

By F. L. GRIFFIN, Reed College, Portland, Ore.

Agreeing heartily with nearly all that Mr. Nyberg says in describing his very interesting and valuable course, in the April issue of the MONTHLY, I reluctantly feel obliged to record a difference of opinion on certain points.

(1) *As to the comparative difficulty of his course and the one which I outlined.*

The chief difference as regards scope is that in my course elementary integral calculus replaces the more advanced parts of trigonometry, college algebra and analytics in his. It should be remembered that we carefully avoid problems in which the details are very complicated; and that we introduce the calculus gradually, returning to it again and again during the year, and thus driving it home with a minimum of difficulty; also, that elementary integral calculus is much easier for the average student to understand than the more advanced and abstract parts of trigonometric analysis, such as the general treatment of imaginaries and vectors, progressive waves, the solution of cubics, etc., or the study of higher plane curves, hyperbolic functions, etc. The fact is that my course formerly included more of these topics and less integral calculus, and was noticeably more difficult then. Consequently, I am unable to conceive how his course could succeed in any institution where mine would fail.

Indeed I do not understand why anyone should expect my course to fail with the class of students found in our state universities. After having taught the course five years to students whose preparation has varied all the way from a year of algebra and a term of geometry to four years of mathematics, I should expect the course to succeed almost anywhere with good teaching. Our students work well, but their *preparation* is in no way unusual. Their knowledge of the technique of algebra and the facts of geometry is decidedly defective.

(2) *As to the importance of including integral calculus.* It ought to be possible for prospective workers in physical chemistry, biology, statistics, or economics to get in one year the mathematical equipment which they need, including some understanding of the elementary applications of integration. If any university is not interested in providing such equipment (supposing this to be feasible), so much the worse for that university. Moreover, for physicists, integral calculus is many times as useful as differential. Again, the student specializing in mathematics should become familiar with both branches of the calculus as early as possible. Also "the non-specialist who wishes an introduction to mathematics" should by all means see something of integral calculus. The inclusion of this subject tends decidedly to unify the whole, and to give the student a "knowledge of calculus" that will really "compensate" him for the omission of other topics. Why allow the complex variable, and the witch, cissoid, conchoid, and polar equations of conics to shut out the most valuable part of the course?

(3) Finally, my statement that "the more theoretical parts of college algebra and analytics are postponed to the junior year" seems to have been misleading. The analytics as a whole is not postponed, but only the study of the more intricate parts. All the usual type equations are covered—in fact, all the plane analytics needed for the usual work in calculus.

Relating to the Slope-angle of a Curve.

By H. B. Phillips, Massachusetts Institute of Technology.

The recent review of my analytic geometry by Dr. G. R. Clements contains a rather severe criticism of my use of the angle φ from the x-axis to a line. If I